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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,054	04/08/2004	Mori Nagayama	50195-421	7337

7590 12/22/2006  
MCDERMOTT, WILL & EMERY  
600 13th Street, N.W.  
Washington, DC 20005-3096

EXAMINER
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LEWIS, BEN

ART UNIT	PAPER NUMBER
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1745

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/22/2006	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/820,054	NAGAYAMA, MORI	
	Examiner	Art Unit	
	Ben Lewis	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____                                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____   | 6) <input type="checkbox"/> Other: ____                           |

### **Detailed Action**

1. The Applicant's amendment filed on October 10<sup>th</sup>, 2006 was received. Claims 1 and 6 were amended.
2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action (issued on July 10<sup>th</sup>, 2006).

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-6,8, 10,12,14 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamamoto et al. (U.S. Patent No. 6,890,685 B2).

With respect to claims 1, 4, 6,10,12,16 Yamamoto et al teach that this invention provides an anode for a secondary battery capable of occluding and releasing lithium

ions, the anode having a multi-layer structure comprising: a first layer containing carbon as a main component; and a second layer as a main component containing a lithium-occluding material film, the film capable of occluding lithium more than a theoretical lithium-occlusion capacity for carbon (Col 2 lines 55-67).

Regarding an anode layer including at least one of: oxide, sulfide and a salt of other metal which forms an alloy with the metal to be obtained by reducing the metal ion, Yamamoto et al teach that a Li-containing layer 8e is an anode member capable of occluding or releasing lithium during charging and discharging, which is prepared by adding Li to a lithium occluding material capable of occluding more lithium than a theoretical capacity of carbon. Examples of such a material include silicon, tin, their alloys and their metal oxides, which can be used alone or in combination of two or more (Col 18 lines 30-45).

Regarding boron-added carbon and the anode layer thickness, Yamamoto et al teach that the second anode layer 3a may have a thickness of, for example, 0.1 $\mu$ m to 240 $\mu$ m. The second anode layer 3a may be doped with boron, phosphorous, arsenic or antimony to reduce a specific resistance (Col 7 lines 40-55).

With respect to claim 2, Yamamoto et al teach that the second anode layer 3a may have a thickness of, for example, , 0.1 $\mu$ m to 240 $\mu$ m. The second anode layer 3a may be doped with boron, phosphorous, arsenic or antimony to reduce a specific resistance (Col 7 lines 40-55).

With respect to claim 3 and 5, Yamamoto et al teach that a Li-containing layer 8e is an anode member capable of occluding or releasing lithium during charging and discharging, which is prepared by adding Li to a lithium occluding material capable of occluding more lithium than a theoretical capacity of carbon. Examples of such a material include silicon, tin, their alloys and their metal oxides, which can be used alone or in combination of two or more (Col 18 lines 30-45).

Regarding boron-added amorphous carbon or boron-added graphite, Yamamoto et al teach that that the second anode layer 3a may have a thickness of, for example, , 0.1 $\mu$ m to 240 $\mu$ m. The second anode layer 3a may be doped with boron, phosphorous, arsenic or antimony to reduce a specific resistance (Col 7 lines 40-55).

With respect to claim 8, 14, Yamamoto et al teach that a Li-containing layer 8e is an anode member capable of occluding or releasing lithium during charging and discharging, which is prepared by adding Li to a lithium occluding material capable of occluding more lithium than a theoretical capacity of carbon. Examples of such a material include silicon, tin, their alloys and their metal oxides, which can be used alone or in combination of two or more (Col 18 lines 30-45).

### **Claim Rejections - 35 USC § 103**

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. (U.S. Patent No. 6,890,685 B2) as applied to claims 1-6,8, 10,12,14 and 16 above and further in view of Hossain (U.S. Patent No. 5,595,839).

With respect to claims 7 and 13, Yamamoto et al. disclose an anode for secondary battery in paragraph 2 above. Yamamoto et al. do not specifically teach wherein the lithium ion secondary battery has a structure including a plurality of bipolar electrodes serially stacked by interposing electrolyte therebetween. However, Hossain teach a bipolar lithium-ion rechargeable battery wherein the rechargeable, lithium-ion battery comprises a plurality of individual electrochemical cells having positive and negative electrodes disposed in opposite face-to-face arrangement with a porous separator containing electrolyte therebetween, and wherein the positive and negative electrodes of adjacent cells are disposed in contact respectively with opposite sides of a common current-collecting element forming a unitary bipolar structure (Col 2 lines 20-40). Therefore it would have been obvious to one of ordinary skill in the art to

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incorporate the bipolar structure of Hossain into the lithium-ion battery of Yamamoto et al because Hossain each that it has been surprisingly discovered that a significant improvement in high rate performance, beyond what might normally be expected, is possible with the bipolar design of the present invention (Col 4 lines 40-55).

7. Claims 9 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. (U.S. Patent No. 6,890,685 B2) as applied to claims 1-6,8, 10,12,14 and 16 above and further in view of Izuchi et al. (U.S. Patent No. 6,902,848 B1).

With respect to claims 9 and 15, Yamamoto et al. disclose an anode for secondary battery in paragraph 2 above. Yamamoto et al. do not specifically teach wherein the electrolyte comprises polymer used in a gel form or solid form. However, Izuchi et al. discloses a lithium battery including a gel electrolyte wherein an object of the present invention is to provide a lithium battery which exhibits a gel electrolyte ion conductivity kept at a high level and allows smooth migration of lithium ion in the gel electrolyte without the necessity of any special production step to keep its performance at a sufficient level even during high rate discharge and have a prolonged life and a stable battery performance (Col 2 lines 10-21). Therefore it would have been obvious to one of ordinary skill in the art to incorporate the gel electrolyte of Izuchi et al. into the lithium-ion battery of Yamamoto et al because Izuchi et al. teach that since the concentration of lithium salt in the gel electrolyte is high, polarization accompanying the

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migration of lithium ion can be relaxed during high rate discharge, providing a good charge and discharge performance (Col 4 lines 24-30).

8. Claims 11 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. (U.S. Patent No. 6,890,685 B2) as applied to claims 1-6,8, 10,12,14 and 16 above and further in view of Nemoto et al. (U.S. Patent No. 6,368,750 B1).

With respect to claims 11 and 17, Yamamoto et al. disclose an anode for secondary battery in paragraph 2 above. Yamamoto et al. do not specifically teach wherein the assembled battery is used for a vehicle. However, Nemoto et al. discloses a lithium secondary battery wherein the present invention relates to, among secondary batteries to be used as an operational power source for portable electronic equipment, or as a motor driving battery for an electric vehicle or a hybrid electric vehicle, etc., a lithium secondary battery which has small internal resistance and has good charge-discharge cycle characteristics, with a lithium transition metal compound being used as a positive active material (Col 1 lines 5-15). Therefore it would have been obvious to one of ordinary skill in the art to incorporate the gel electrolyte Nemoto et al. into the lithium-ion battery of Yamamoto et al because Nemoto et al. teach that Such a battery is generally called a lithium secondary battery or a lithium ion battery, and since they are provided with larger energy density as well as with higher unit cell voltage of



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approximately 4V, attention is being paid to these batteries not only for the aforementioned electronic equipment but also as a motor driving power source for an electric vehicle or a hybrid electric vehicle (Col 1 lines 24-35).

### ***Response to Arguments***

9. Applicant's arguments filed on October 10<sup>th</sup>, 2006 have been fully considered but they are not persuasive.

*Applicant's principal arguments are*

*(a) Yamamoto et al., however, do not anticipate the claimed anode electrode and lithium ion secondary battery because Yamamoto et al. do not disclose the anode layer which includes boron-added carbon and has a thickness of 30  $\mu\text{m}$  or less, as required by claims 1 and 6; and do not disclose the lithium ion secondary battery wherein the anode layer has a thickness of less than 1  $\mu\text{m}$ , as required by claims 4 and 12. As shown in FIG 6 of the present application, when using the anode layer which includes boron-added carbon and has a thickness of 30  $\mu\text{m}$  or less, or using the anode layer which includes carbonaceous material and has a thickness less than 1  $\mu\text{m}$ , deposition of lithium metal can be prevented.*

In response to Applicant's arguments, please consider the following comments.

(a) Regarding boron-added carbon and the anode layer thickness, Yamamoto et al teach that the second anode layer 3a may have a thickness of, for example, 0.1 $\mu$ m to 240 $\mu$ m. The second anode layer 3a may be doped with boron, phosphorous, arsenic or antimony to reduce a specific resistance (Col 7 lines 40-55).

### ***Conclusion***

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's Trainer, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

  
PATRICK JOSEPH EGAN  
SUPERVISORY PATENT EXAMINER

Patent Examiner  
Art Unit 1745

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